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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Norman P Soloway
Hayes Soloway Hennessey Grossman & Hage
130 W Cushing Street
Tucson, AZ 85701

EXAMINER

CULBERT, ROBERTS P

ART UNIT

PAPER NUMBER

1763

DATE MAILED: 09/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/890,471

Applicant(s)

BERG, N. EDWARD

Examiner

Roberts Culbert

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 December 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) _____ is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 September 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

Art Unit: 1763

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 31, and 40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 31 recites the limitation (step d) of "removing the pattern mask whereby to expose the metallic patterns" The limitation is not clear because the metallic patterns are already exposed (step b), and have been built up (step c). Step (e) is further unclear because one cannot determine if "the exposed metallic surfaces" are the same as the "exposed metallic patterns" in steps b and c.

Claim 40 recites the limitation of "removing the resulting structure from the first substrate". It is not clear what the *resulting structure* consists of as there is no antecedent basis for the term, and the term is not defined in the claims. Further it is not clear how the structure is removed, as the first substrate would naturally be a part of any resulting structure.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,321,380 to Godek.

Referring to the figures, Godek teaches a method of forming a circuit board, comprising the steps of: supplying a non-conducting substrate having a top surface and a bottom surface; forming a plurality of

Art Unit: 1763

conductive pathways (38) between said top surface and said bottom surface; forming a first circuit pattern (18) on said top surface; and forming a second different circuit pattern (20) on said bottom surface.

Godek also teaches that the step of printing one or more circuit devices on said first circuit pattern and on said second circuit pattern is old in the art of forming circuit boards including resistors and capacitors (Col. 1, Lines 24-28). Godek further teaches printing inductors and transformers is known in the art (Col. 1, Lines 31-41).

Claims 12 and 25 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 3,660,726 to Ammon.

Referring to the figures, Ammon teaches a method for making a multi-layer circuit board comprising, supplying a first substrate (10) having a first top surface and a first bottom surface; forming a plurality of electrically conductive pathways (18) between said first top surface and said first bottom surface; forming a first circuit pattern (16) on said first top surface; forming a second circuit pattern on said first bottom surface (19); supplying a second substrate having a second top surface and a second bottom surface; forming a plurality of electrically conductive pathways between said second top surface and said second bottom surface; forming a third circuit pattern on said second top surface; forming a fourth circuit pattern on said second bottom surface; supplying a first insulating layer (20) having a first side and a second side; joining said first side of said first insulating layer to said first bottom surface, and joining said second side of said first insulating layer to said second top surface, such that said first insulating layer electrically insulates said second circuit pattern from said third circuit pattern; forming a plurality of electrically conductive pathways (21) between said first circuit pattern, said second circuit pattern, said third circuit pattern, and said fourth circuit pattern. Ammon also shows supplying a third substrate having a third top surface and a third bottom surface; forming a plurality of electrically conductive pathways between said third top surface and said third bottom surface; forming a fifth circuit pattern on said third top surface; forming a sixth circuit pattern on said third bottom surface; supplying a second insulating layer (20) having a first side and a second side; joining said first side of said second insulating layer to said second bottom surface, and joining said second insulating layer to

Art Unit: 1763

said third top surface, such that said second insulating layer electrically insulates said fourth circuit pattern from said fifth circuit pattern; and joining a plurality of electrically conductive pathways (21) between said first circuit pattern, said second circuit pattern, said third circuit pattern, said fourth circuit pattern, said fifth circuit pattern, and said sixth circuit pattern.

Claims 31 and 39 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,028,513 to Murakami.

Murakami teaches a prior art method of forming a circuit board, comprising steps in sequence of: supplying a non-conducting substrate having a top surface and a bottom surface each covered with a top and a bottom metallic layer, respectively; forming a pattern mask on the top and the bottom metallic layers, leaving exposed metallic patterns; building up the exposed metallic patterns by plating to increase the thickness thereof; removing the pattern mask whereby to expose the metallic patterns; and etching the metallic layer coated substrate whereby to remove exposed metallic surfaces, while leaving intact at least a portion of the built-up metallic patterns. (See, for example, Col. 1, Lines 14-16, and 30-41)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,321,380 to Godek in view of U.S. Patent 4,991,287 to Piatt and U.S. Patent 4,770,900 to Seibel.

As applied above, Godek teaches the method of the invention substantially as claimed, but does not teach printing an etch resist mask.

Piatt teaches that a pattern mask may be printed on a metallic layer. (Col. 2, Lines 50-55) It would have been obvious to one of ordinary skill in the art at the time of invention to form the mask

Art Unit: 1763

pattern of Godek using printing as shown by Piatt. One of ordinary skill in the art would have been motivated at the time of invention to use the printing method taught by Piatt in order to enable transfer of the pattern image directly from a computer as shown by Piatt. (Figure 1A)

Although Piatt teaches a subtractive method of forming the circuit pattern and Godek teaches the semi-additive method of forming the circuit pattern, the step of applying the pattern mask is the same and so would work with either method. Furthermore, both methods of patterning the copper layer are well known in the art as alternative methods of patterning after masking. (See Seibel Col. 1, Lines 16-39)

Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 3,660,726 to Ammon in view of U.S. Patent 5,932,280 to Roth.

As applied above, Ammon teaches the method of the invention substantially as claimed, but does not teach printing circuit devices on the circuit board pattern.

Roth teaches that resistors may be printed onto a circuit board using direct thermal printing. (See Abstract) It would have been obvious to one of ordinary skill in the art at the time of invention to form resistors on the circuit pattern by printing in order to eliminate the need for discrete resistors as taught by Roth. (Col. 1, Lines 38-40)

Claims 15-24, and 26-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 3,660,726 to Ammon in view of U.S. Patent 4,991,287 to Piatt and U.S. Patent 4,770,900 to Seibel.

As applied above, Ammon teaches the method of the invention substantially as claimed, but does not teach printing an etch resist mask or the use of a semi-additive process (plating to increase thickness) to form the circuit patterns.

Piatt teaches that a pattern mask may be printed on the metallic layer of a circuit board. (Col. 2, Lines 50-55) It would have been obvious to one of ordinary skill in the art at the time of invention to form the mask pattern using printing as shown by Piatt. One of ordinary skill in the art would have been

Art Unit: 1763

motivated at the time of invention to use the printing method taught by Piatt in order to enable transfer of the pattern image directly from a computer as shown by Piatt. (Figure 1A).

Although Piatt teaches a subtractive method of forming the circuit pattern and the claimed invention teaches a semi-additive method of forming the circuit pattern, the step of applying the pattern mask is the same and so would work with either method. Furthermore, both methods of patterning the copper layer are well known in the art as alternative methods of patterning after masking. (See Seibel Col. 1, Lines 16-39)

Claims 32-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,028,513 to Murakami in view of U.S. Patent 4,991,287 to Piatt.

As applied above, Murakami teaches the method of the invention substantially as claimed, but does not teach the use of printing a pattern mask on the metallic layers.

Piatt teaches that a pattern mask may be printed on a metallic layer. (Col. 2, Lines 50-55) It would have been obvious to one of ordinary skill in the art at the time of invention to form the mask pattern of Murakami using printing as shown by Piatt. One of ordinary skill in the art would have been motivated at the time of invention to use the printing method taught by Piatt in order to enable transfer of the pattern image directly from a computer as shown in Piatt.

Regarding claims 34-38, Official Notice is taken of the fact that the use of a fusible ink masks including silver and palladium is old and well known in the art of forming circuit boards. Further, It would have been obvious to pre-heat the substrate within the claimed range prior to printing in order to ensure adherence of the ink to the substrate, as the melting temperature of the ink is known in the art

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 4,870,746; US 4,526,835; US 6,160,714; JP 58210693; JP 60024990; JP 59188991.

Art Unit: 1763

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Roberts Culbert whose telephone number is (703) 305-7965. The examiner can normally be reached on Monday-Friday (7:30-4:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703) 308-1633. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

R. Culbert



GREGORY MILLS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700